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SUBIC BAY FLEET MOORINGS UNDERWATER INSPECTION: PROJECT
EXECUTION PLAN(U) NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON DC CHESAPEAKE DIV JUN 82

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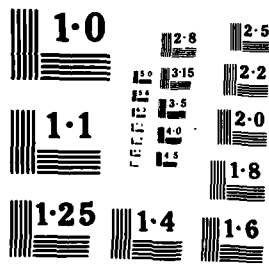
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The purpose of this plan is to accurately define the responsibilities of the task team and to provide a comprehensive plan of action for the inspection of 18 riser type and two telephone type fleet moorings currently operated and maintained by PWC Subic Bay. Underwater Construction Team Two (UCT-2) (Con't)

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will provide underwater inspection personnel and CHESNAVFACENGCOM (code FPO-1)
will provide a Project Engineer for technical support.

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SUBIC BAY FLEET MOORINGS
UNDERWATER INSPECTIONS

PROJECT EXECUTION PLAN

JUNE 1982

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FORWARD

This Project Execution Plan (PEP) is based on the limited information currently available to CHESNAVFACENGCOM personnel. The Project Engineer will spend the week prior to the commencement of the inspection with PWC SUBIC personnel reviewing the latest data and information that they may have concerning the material condition of the moorings. Upon completion of this review, the PEP will be completed on site, and the final format distributed to interested commands.

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PROJECT EXECUTION PLAN

1.0 PURPOSE: The purpose of this plan is to accurately define the responsibilities of the task team and to provide a comprehensive plan of action for the inspection of 18 riser type and two telephone type fleet moorings currently operated and maintained by PWC Subic Bay. Figure 1 depicts the geographical positions of the mooring sites. Underwater Construction Team Two (UCT-2) will provide underwater inspection personnel and CHESNAVFACENGCOM (code FPO-1) will provide a Project Engineer for technical support.

2.0 REFERENCE DATA:

- 2.1 NAVFAC DM-26, Design Manual, Harbor and Coastal Facilities, July 1968 including change 1.
- 2.2 NAVFAC MO-124, Mooring Maintenance, December 1973.
- 2.3 Naval Facilities Engineering Command Facilities Management Expense Operating Plan for Procurement and Maintenance of Fleet Moorings, 1981.
- 2.4 BUDOCKS and NAVFAC Mooring Reports for Subic Bay during the period of 1949 to 1981.
- 2.5 NAVFAC Drawing Number 7161765, 29 November 1976, Navigational Aids and Fleet Mooring Buoys System at Subic Bay.

3.0 GENERAL DESCRIPTION: Current reports indicate that PWC Subic maintains 20 Fleet Moorings ranging in size from Class A to Class D with designed holding powers from 150 to 50 Kips respectively. Figure B-1 in Annex B shows the 1977 locations of these moorings. The water depths in which these moorings are located range from 26 to 120 feet. In view of the known bottom conditions and age of the moorings, a major portion of

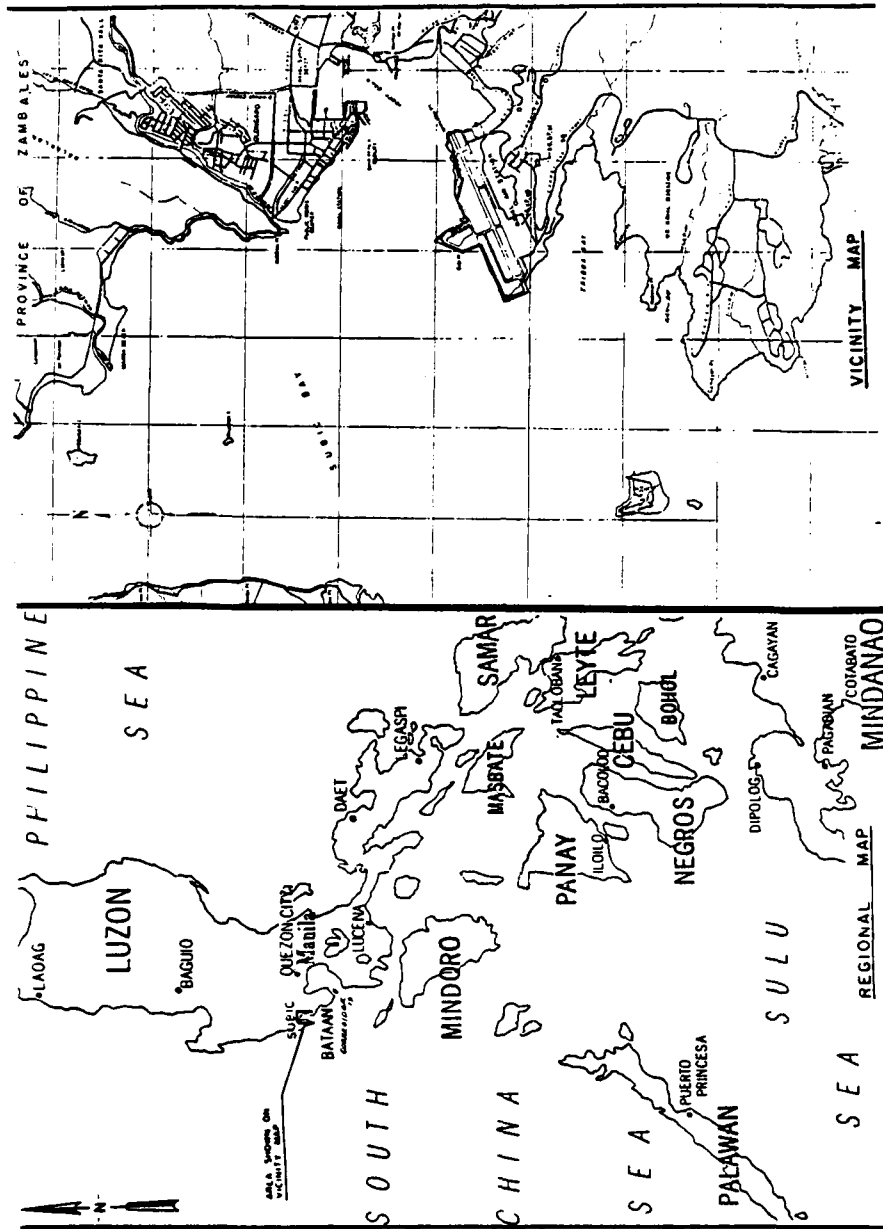


FIGURE 1.

these mooring systems may be buried in mud at or below the lower end of the riser, and the ground ring, ground legs, and anchors could be buried in the bottom. In addition, there is no evidence that a cathodic protection system has ever been installed on any of these moorings. Figures 2 and 3 show typical riser and telephone type moorings respectively.

The inspection scenario is to conduct a diver inspection of each of the 20 moorings using surface supplied air and voice communications equipment. Physical measurements, using pre-cut gauges and calipers, will be taken of all accessible components. Accurate position data will be generated for the buoys and the ground legs. The buoys will be sighted from known reference locations on land. The ground leg orientation will be determined by marking anchor locations, if found, with marker buoys and sighting from the mooring buoy. Potential readings will be taken using underwater voltmeters, on any mooring or buoys found to be cathodically protected.

Time permitting, several methods for exposing buried chain for measurement will be explored. Lift bags of various capacities will be employed to attempt lifting the ground ring out of the mud without disrupting the anchors. A commercial gold dredge, which is capable of moving a few feet of sediment, may also be utilized to try to expose more chain.

While not assisting in the diver inspection, the CHESNAVFACENGCOM Engineer will assess the types, condition, and quantities of stored mooring material inventories, identify available Navy mooring maintenance support equipment, and document local commercial construction capabilities and rates.

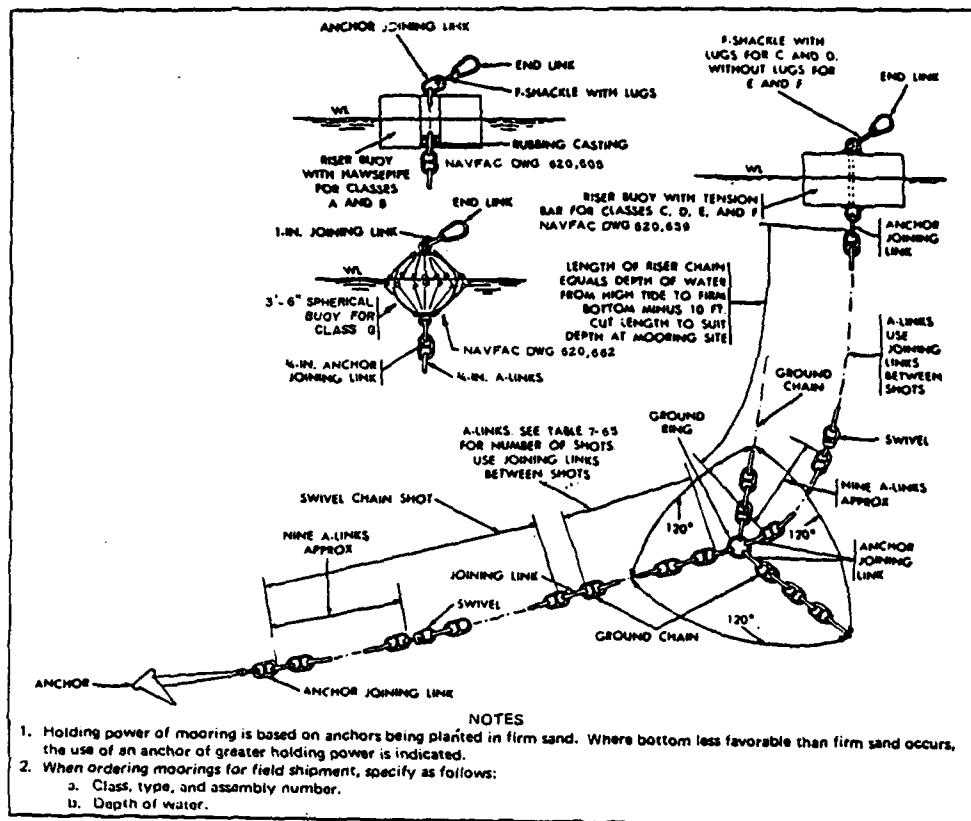


FIGURE 2. TYPICAL RISER-TYPE MOORING

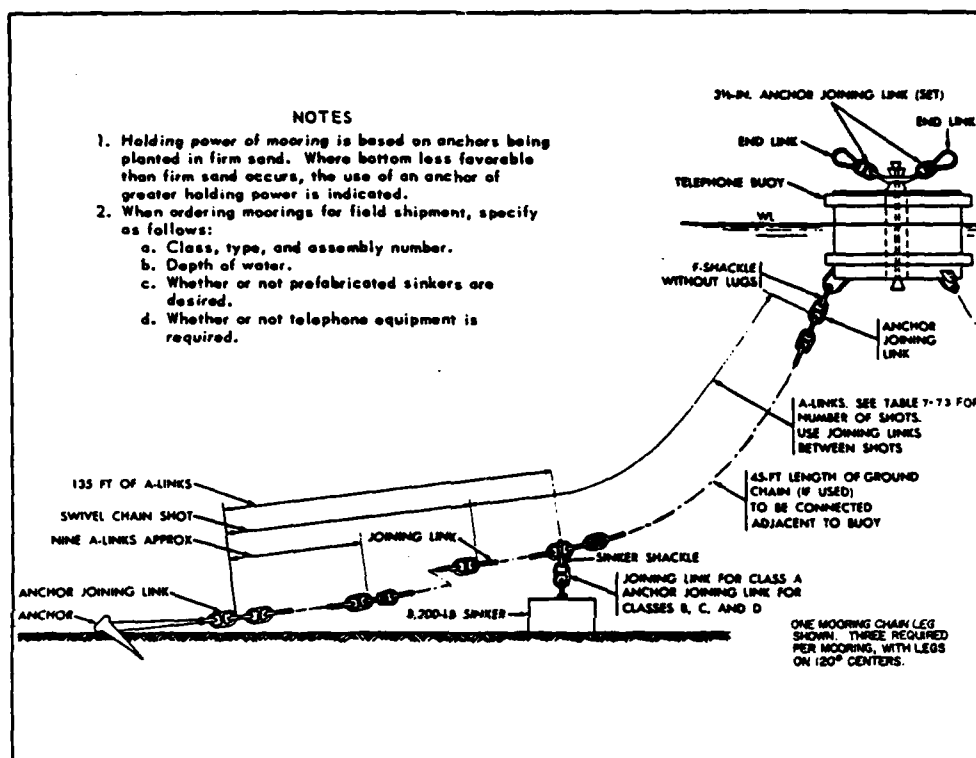


FIGURE 3. TYPICAL TELEPHONE-TYPE MOORING

4.0 INSPECTION PROCEDURES: The following are the general inspection procedures that will be followed. Schematic drawings of locations to be measured in riser or telephone type moorings appear in Figure 4 and 5 respectively.

4.1 Site Survey: Each buoy is to be accurately sighted from land. Reference drawing 7161765 gives known coordinates for land points. If a ship is moored, this is to be noted along with current and wind speeds and directions at the time of the survey.

4.2 Buoy:

4.2.1 Buoy Topside: The buoy shall be observed to determine its general condition. The buoy markings shall be checked for conformance to those noted in applicable charts. Physical damage such as holes, dents, or listing shall be described. If the buoy is fiberglass coated, then the fiberglass should be inspected for cracks, wear, or peeling. A check will be made to see if the hatches have been fiberglassed over. If the buoy has not been fiberglassed, then the paint will be checked for cracking, chipping, and peeling. Hatches, openings, and penetrations will be examined and broken parts and rust will be reported.

The buoy fenders and rubbing rails shall be checked for integrity and sound connection to the buoy.

Buoy top jewelry shall be described and measured with calipers to find the overall outside dimensions and areas of most severe reduction in wire size.

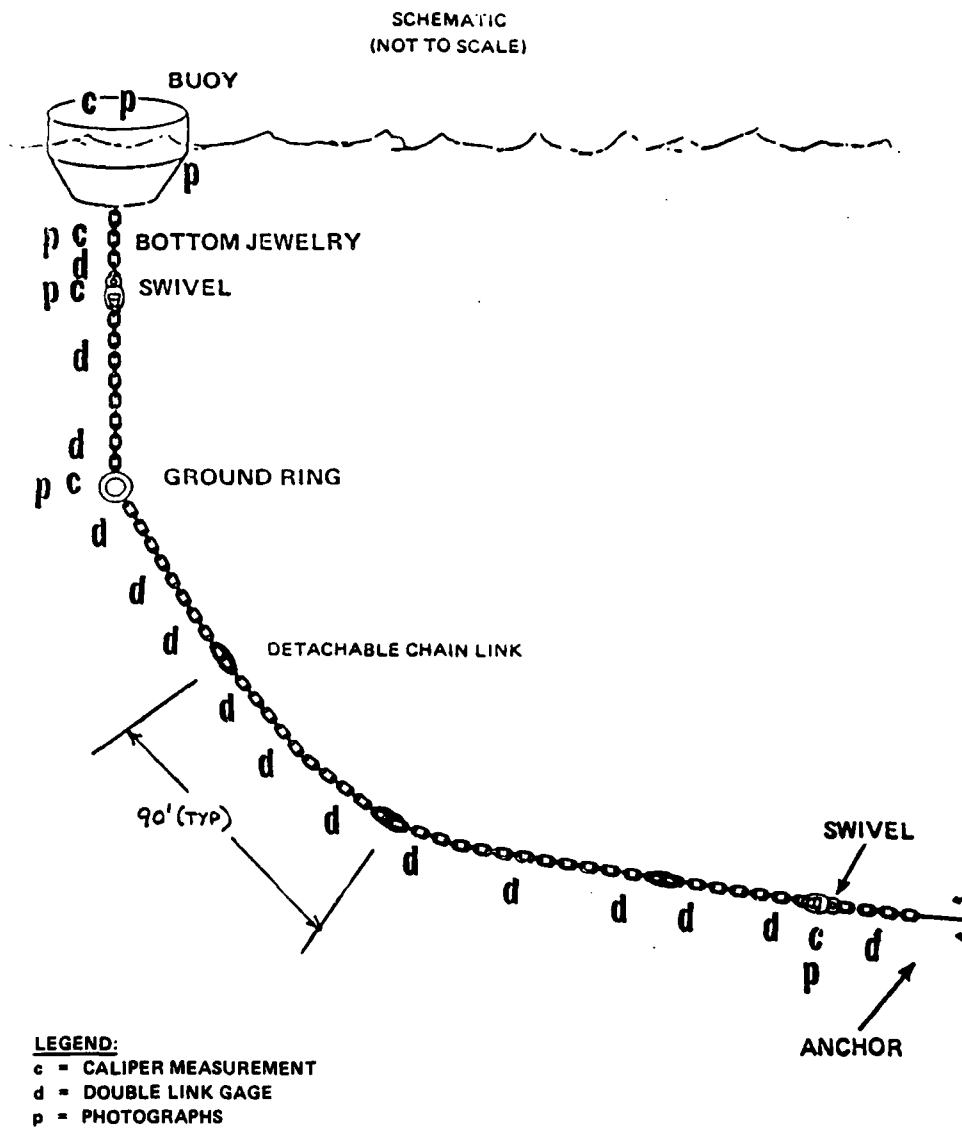
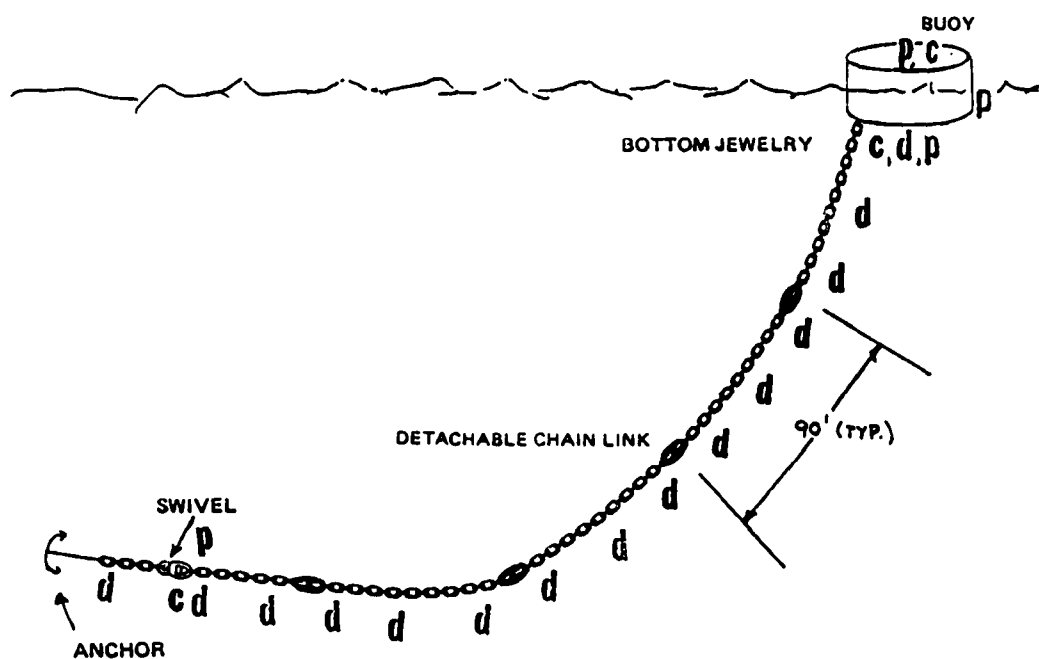


FIGURE 4. MEASUREMENT LOCATIONS RISER-TYPE MOORINGS

SCHEMATIC
(NOT TO SCALE)



LEGEND:
 c = CALIPER MEASUREMENT
 d = DOUBLE LINK GAGE
 p = PHOTOGRAPHS

FIGURE 5. MEASUREMENT LOCATIONS TELEPHONE-TYPE MOORING

- 4.2.2 Buoy Lower Portion: Divers shall thoroughly inspect the buoy below the waterline. The thickness of marine growth shall be recorded, three one foot square areas shall be selected and cleared of growth without damaging the paint or fiberglass, and the condition of the paint or fiberglass will be noted. If the buoy is a riser type with a hawse pipe, the presence and condition of the rubbing casting shall be recorded. If the buoy is cathodically protected, the condition, dimensions, and connection of anodes are to be noted. Then, electrical potential readings are to be taken with an underwater voltmeter at three locations on the buoy bottom.
- 4.3 Bottom Jewelry: On all moorings, the bottom jewelry connecting the buoy to the riser (or to the ground legs in a telephone mooring) shall be identified and measured with calipers. Again, as in the topside jewelry, the overall dimensions and the smallest wire size will be recorded.
- 4.4 Riser: Each 90' shot or large fraction thereof shall be inspected in the same manner. Three consecutive double link measurements using pre-cut gauges will be made at both ends and near the center of each shot of chain. In those cases that a segment of chain is resting on the bottom and not in tension, *single link measurements will be substituted for double link measurements*. The shots of chain are joined with detachable links which shall be marked with plastic tags for future reference.

All connecting hardware including detachable links, anchor joining links, pear links, end links, swivels, and shackles shall be identified and measured with calipers. Worn hardware and unusual chain joining practices, if found, shall be recorded.

4.5 Ground Ring (Riser Type Only): The ground ring shall be examined for general and localized wear. Caliper measurements shall be made of the wire size in the region of the most severe wear and across the inner diameter.

4.6 Ground Legs: Repeat procedure for Riser chain in paragraph 4.4 above.

Proceeding in a clockwise manner, from north, the legs shall be labeled A, B, C, etc. consecutively, and their orientation sketched.

4.7 Anchors: The hardware connecting the anchors to the ground legs shall be measured by calipers in the same manner as the bottom jewelry.

When located, an anchor shall be marked with a marker buoy so that its relative position from the mooring buoy is visible from the surface. This position shall be recorded.

At each anchor location the bottom type shall be recorded.

4.8 Photography:

4.8.1 Topside: Topside photography and ashore photographs are the responsibility of the CHESNAVFACENGCOM Project Engineer.

Photographs will be taken of all buoys showing general conditions. Photographs of the topside jewelry and damaged buoy components will be taken as deemed appropriate by the Project Engineer.

Photographs will be taken of ashore spare mooring material inventories and construction equipment as deemed necessary.

4.8.2 Underwater Photography: Underwater photography shall be the responsibility of UCT-2. Buoy bottoms, anodes, bottom jewelry, worn links, working swivels, ground rings, and other hardware shall be photographed wherever required to support material conditions and when environmentally feasible. Photographs shall include clear annotation as to the location of the hardware being photographed.

5.0 DOCUMENTATION: The CHESNAVFACENGCOM Engineer will document the inspection procedures used and record the data obtained by the diving team. He will recommend additional alternative inspection requirements as deemed necessary during the course of the inspection.

While on site, the CHESNAVFACENGCOM Engineer will investigate the availability and cost of local mooring maintenance support. In addition he will obtain an inventory and document the physical condition of any spare or surplus mooring equipment in storage at PWC Subic.

6.0 MEETINGS/BRIEFINGS: A CHESNAVFACENGCOM Engineer will conduct a preinspection visit to PWC Subic and will meet with station personnel to gather the latest information concerning the moorings and establish project logistics support.

Upon the teams arrival at Subic, the Engineer will conduct a pre-dive briefing to familiarize all diver personnel with component design and inspection criteria and to advise them of possible modifications to this execution plan.

Prior to commencement of the inspection, another meeting will be held with station personnel to confirm logistic support.

A post inspection briefing will be provided to advise station personnel of preliminary inspection findings.

After return to CONUS, presentations will be given to FPO-I personnel.

The Project Engineer will write a Project Completion Report which will contain the results of the inspection and recommendations for corrective maintenance actions. This report, when approved by CHESNAVFACENGCOM, will be forwarded to all interested commands.

7.0 LOGISTICS: The inspection sequence is for a CHESNAVFACENGCOM Project Engineer to make initial contact with a visit to Subic in early to mid May 1982 on the way to the Fleet Mooring Inspection in Diego Garcia. He will obtain supplemental data concerning the moorings' history, current as-built data, existing drawings, environmental conditions, planned maintenance schedules, usage, and known fleet requirements. At that time, logistics for the proposed mid-summer 1982 inspection by UCT-2 will be re-examined. Exact inspection scheduling is dependent upon UCT-2's completion of earlier scheduled tasks in Okinawa and Diego Garcia. The underwater inspection is tentatively planned for mid July and is anticipated to require about four weeks of effort.

UCT-2 will coordinate transportation of personnel and equipment to the site and arrange for on-site berthing and messing.

The following equipment will be provided by UCT-2 in support of the inspection:

- * All diving support equipment sets
- * Measuring aids
 - Outside calipers 24 inch minimum
 - 100' tape measures
 - Scales 1, 2, and 3 feet with large numbers suitable for photo documentation
 - Go-no-go gauges (2 sets)
 - Accurate depth gauges
- * Survey equipment
 - Compass (divers)
 - Survey buoys with line (pop floats)
- * Two Underwater still cameras (35mm) with film (color and B & W) flash with spare batteries
- * Underwater Voltmeters (2) with spare batteries, reference cell and operations manual
- * Cleaning equipment - Hand tools including wire brushes, chipping hammers and sharp chisels. Water blaster with water or hydraulic power supply and brush tool.
- * Waterproof paper

- * Lift bags - two (2,000 pound capacity)
- * Marker tags to relocate or mark chain links
- * Maintenance hand tools, including strong bars, hacksaws, puller hoists, cable cutter, shovels, rigging, wire slings.

The CHESNAVFACENGCOM Project Engineer will provide the following:

- * Inspection plan
- * Data sheets and log books
- * 35mm surface camera and film
- * Drafting supplies, graph paper, scales
- * Calculator
- * Full size and 1/2 size drawings
- * Pre-dive briefing data
- * DM 26

8.0 TRANSPORTATION: Transportation of personnel and equipment will be the responsibility of UCT-2. The Project Engineer will arrange his own transportation and will meet the team on site on the date selected.

9.0 MESSAGE TRAFFIC: Summary status reports will be prepared on site by UCT-2 personnel and reported via message on a weekly basis to CHESNAVFACENGCOM and the UCT's home port.

ANNEX A

1.0 MEASURING DEVICES AND LOCATIONS

Tables A-1 and A-2 outline the 80 and 90 percent measurements for mooring components for both the riser and telephone types of mooring classes. These tables are based on the standard moorings listed in DM-26 and can be used to preset calipers before measuring various items. For example, a class BB riser type mooring will require calipers set to 3.15" (90%) and 2.80" (80%) for single link measurements on the riser; 6.30" (90%) and 5.60" (80%) for double link on the riser; 2.25" and 2.00" for single link on the ground legs; 4.50" and 4.00" for double link on the ground legs; and for the ground ring 5.85" and 5.20".

The preferred measuring devices, however, are back-to-back 80 and 90 percent "go - no go" gauges. These gauges simplify the diver's job in that, unlike calipers, they cannot be knocked out of adjustment underwater, and they do not have to be checked and reset between dives. Figure A-3 contains the drawings and data required to fabricate these gauges. Although these gauges are a quick and efficient way of sampling the wire size of chain links and some jewelry, the diver's still have to carry calipers to measure ground rings and chain connecting links.

Measurement locations for mooring chain are shown in Figure A-4.

TABLE A-1. SINGLE LINK MEASUREMENTS FOR COMPONENTS OF RISER-TYPE MOORINGS
(DOUBLE VALUES FOR DOUBLE LINK MEASUREMENTS)

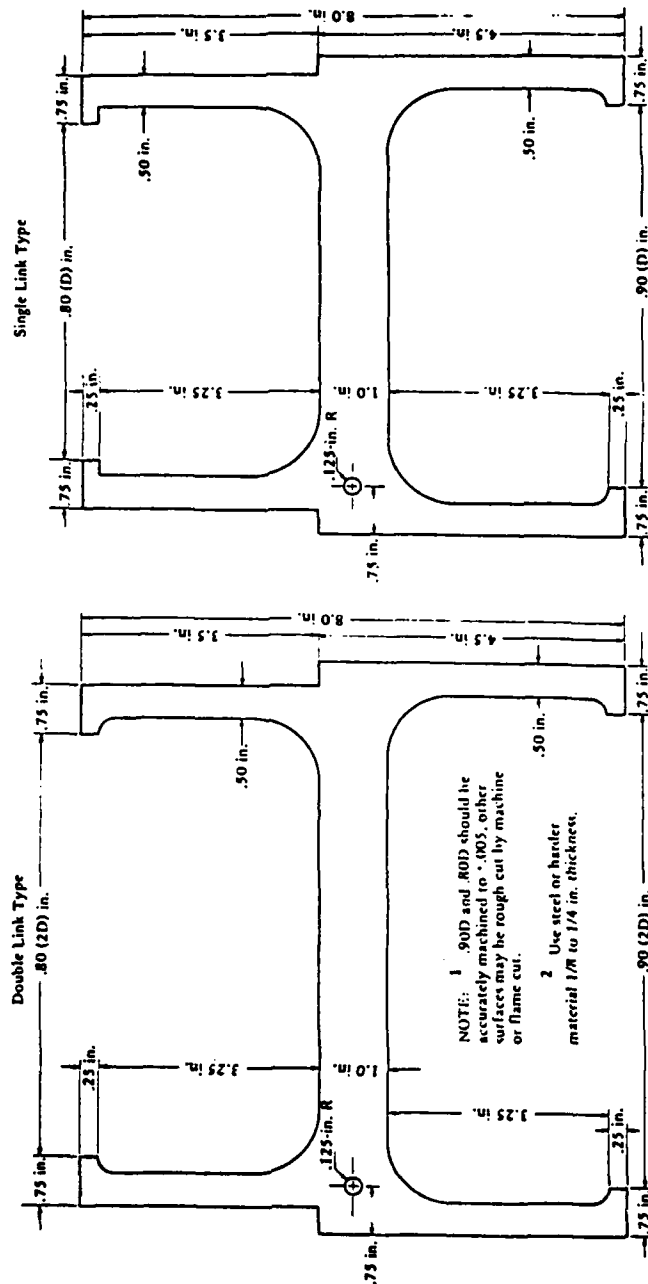
Class Moorings	Percent Remaining	Top of Bury		Riser Chain	Ground Ring		Ground Chain	Ground Latch	Anchor ²	
		F-Shackle	End Link		AJL	Slider			Stockless w/ Stabilizer	LWT
A-A	100	5 3/8	4 1/2	4	6 1/2	4 3	2 3/4	2 3/4"	25,000	-
	90	4.838	3.285	3.6	5.85	3.6 2.7	2.475	type		
	80	4.3	2.92	3.2	5.2	3.2 2.4	2.2	2 1/2"		
B-B	100	4 15/16	3 15/16	3 1/2	6 1/2	4 3	2 1/2	2 1/2"	20,000	13,000
	90	4.44	3.54	3.15	5.85	3.6 2.7	2.25	type		
	80	3.75	3.15	2.8	5.2	3.2 2.4	2.0	2 1/4"		
C-C	100	4 15/16	3 15/16	3 1/2	6 1/2	4 3	2 1/2	2 1/2"	18,000	10,000
	90	4.44	3.54	3.15	5.85	3.6 2.7	2.025	type		
	80	3.95	3.15	2.8	5.2	3.2 2.4	1.8	3"		
D-D	100	4 3/16	3 3/4	3"	6	-	2.7	3"	30,000	-
	90	3.769	3.375	2.7	5.4	-	2.4	type		
	80	3.35	3	2.4	4.8	-	2.2	2 3/4"		
A	100	3 7/8	3 3/8	2 3/4	5 1/2	-	2 3/4	2 3/4"	25,000	-
	90	3.488	3.038	2.475	4.95	-	2.475	type		
	80	3.1	2.7	2.2	4.4	-	2.2	2 1/2"		
B	100	3 1/8	3 1/8	2 1/2	4 3/4	-	2 1/2	2 1/2"	20,000	13,000
	90	3.15	2.813	2.25	4.275	-	2.25	type		
	80	2.8	2.5	2.0	3.8	-	2 1/4	2 1/4"		
C	100	3 1/8	2 3/4	2 1/2	4 1/2	-	2 1/2	2 1/2"	18,000	10,000
	90	2.813	2.613	2.025	4.05	-	2.025	type		
	80	2.5	2.5	1.8	3.6	-	1.8	2 1/4"		
D	100	2 13/16	2 1/2	2"	4	-	2	2"	13,000	6,000
	90	2.531	2.25	1.8	3.6	-	1.8	type		
	80	2.25	2.0	1.6	3.2	-	1.6	2 1/4"		
E	100	2 7/16	2 1/2	1 3/4	3 1/2	-	1 3/4	1 3/4"	9,000	4,000
	90	2.174	2.025	1.575	3.15	-	1.575	type		
	80	1.95	1.8	1.4	2.8	-	1.4	1 1/2"		
F	100	1 3/4	1 3/4	1 1/2	2 3/4	-	1 1/2	1 1/2"	5,000	2,000
	90	1.575	1.575	1.125	2.813	-	1.125	type		
	80	1.4	1.4	1.0	2.5	-	1.0	1"		
G	100	1 1/16	.1	3/4	1 7/8	-	3/4	3/4"	3,000	300
	90	.956	.9	.675	1.688	-	.675	type		
	80	.85	.8	.6	1.5	-	.6	1"		

1. AJL measurement vary according to manufacturer, see PM-76
2. Assumes firm sand bottom
3. Assumes cast steel chain

TABLE A-2. SINGLE LINK MEASUREMENTS FOR COMPONENTS OF TELEPHONE-TYPE MOORINGS
(DOUBLE VALUES FOR DOUBLE LINK MEASUREMENTS)

Class Mooring	Percent Remaining	Top of Buoy End Link	Buoy-to-Ground Lackle		Ground Lackle		Stockless/Stabilizer	Anchor ¹ Lbf
			D/I - Chackle	All - Spider	All - type	Chain		
A-A	100	4', 3.285	4 11/16 4.219	4 3.6	2 3/4" type	2 3/4" 2.475	25,000	-
	90	2.92	3.75	3.2	2.4	2.2		
	80							
B-B	100	4', 3.285	4 11/16 4.219	4 3.6	2 3/4" type	2 3/4" 2.475	20,000	13,000
	90	2.92	3.75	3.2	2.4	2.2		
	80							
C-C	100	4', 3.285	4 11/16 4.219	4 3.6	2 3/4" type	2 3/4" 2.475	18,000	10,000
	90	2.92	3.75	3.2	2.4	2.2		
	80							
D-D	100	4', 3.285	4 11/16 4.219	4 3.6	2 3/4" type	2 3/4" 2.475	30,000	-
	90	2.92	3.75	3.2	2.4	2.2		
	80							
A	100	3 3/8 3.038	3 7/8 3.406	2 3/4" type	2 3/4" type	2 3/4" 2.475	25,000	-
	90	2.7	3.1			2.2		
	80							
C	100	3 3/8 3.038	3 7/8 3.406	2 3/4" type	2 3/4" type	2 3/4" 2.475	20,000	13,000
	90	2.7	3.1			2.2		
	80							
C	100	3 3/8 3.038	3 7/8 3.406	2 3/4" type	2 3/4" type	2 3/4" 2.475	10,000	10,000
	90	2.7	3.1			2.2		
	80							
D	100	3 3/8 3.038	3 7/8 3.406	2 3/4" type	2 3/4" type	2 3/4" 2.475	13,000	6,000
	90	2.7	3.1			2.2		
	80							

1. All measurements vary according to manufacturer, see DM-26.
2. Assumes firm sand bottom.
3. Assumes cast steel chain.



D"	Single Link		Double Link		D"	Single Link		Double Link		D"	Single Link		Double Link	
	.90D	.80D	.90(2D)	.80(2D)		.90D	.80D	.90(2D)	.80(2D)		.90D	.80D	.90(2D)	.80(2D)
6-1/2	① 5.85	9.20	—	—	3-1/2	⑥ 3.15	2.80	① 5.30	5.60	2	① 1.80	1.60	② 3.60	2.20
6	② 5.40	4.80	—	—	3	⑦ 2.70	2.40	① 5.40	4.80	1-7/8	② 1.69	1.50	—	—
5-1/2	③ 4.95	4.40	—	—	2-3/4	⑧ 2.48	2.20	① 5.16	4.40	1-3/4	③ 1.58	1.40	② 3.06	2.80
4-1/2	④ 4.05	3.60	—	—	2-1/2	⑨ 2.25	2.00	② 4.50	4.00	1-1/2	④ 1.35	1.20	③ 2.70	2.40
⑤ 3.60	3.20	⑤ 2.20	6.40	6.40	2-1/4	⑩ 2.03	1.80	② 4.06	3.60	1-1/4	⑤ 1.125	1.00	—	—

FIGURE A-3. 10 PERCENT "GO-NO-GO" GAUGES

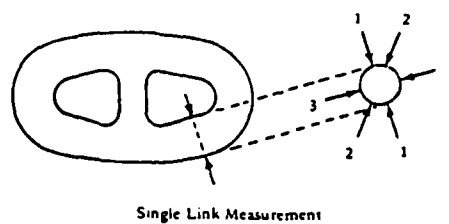
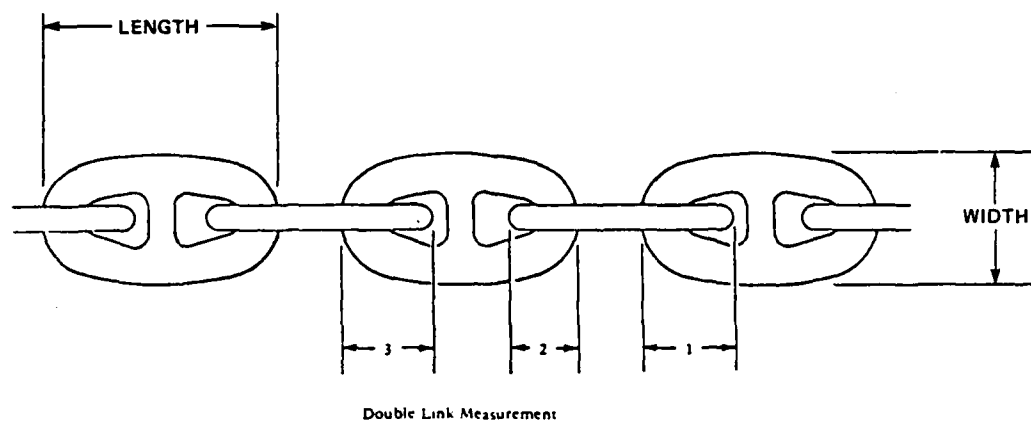


FIGURE A-4. LOCATIONS FOR TAKING CHAIN LINK MEASUREMENTS

ANNEX B

1.0 MOORING DATA

This section contains pertinent information on an individual mooring basis.

1.1 Figure B-1 is a map depicting the location of the fleet moorings in 1977.

STATION & # - (CLASS)

SUBIC - 2 - (A-RISER)

FILE DATA: 7 JUL 78 Inspection Measurements
 14 APR 72 Inspection Report
 31 JUL 61 Inspection Report

MOST RECENT DATA:

SITE: Depth = 44'¹
 Bottom = Mud
 Lat: 14° 48' 02" Long 120° 16' 06"

CHAIN: Riser: +90%
(78 Data) G.R.: +90%
 Leg 1: +90% DL + 80% SL
 Leg 2: +80% DL + SL
 Leg 3: +90% DL + 80% SL

VOLTMETER -.666 to -.722
RANGE:

COMMENTS: Anchors Buried In Mud, Not Inspected
 O.H. in 80 called "GOOD" in 82
 Next O.H. October '86

STATION & # - (CLASS)

SUBIC - 6 - (B-RISER)

FILE DATA: 6 JUL 78 Inspection Measurements
 24 JAN 73 Inspection Report

MOST RECENT DATA:

SITE: Depth = 26'
 Bottom = Mud
 Lat: 14° 49' 24" Long 120° 17' 14"

CHAIN: Riser: +90% SL + DL
(78 Data) G.R.: +90% DL (2' Off Bottom)

VOLTMETER -.617 to -.625
RANGE:

COMMENTS: Legs & Anchors Buried In Mud, Not Inspected
 365 Day Usage
 Last O.H. 63 Planned '83 Too Long
 Called "GOOD" FY 82

STATION & # - (CLASS)

SUBIC - 10 - (D-RISER)

FILE DATA: 6 JUL 63 Mooring Report
 28 FEB 73 Inspection Report
 6 JUL 78 Inspection Measurements

MOST RECENT DATA:

SITE: Depth = 17'
 Bottom = Mud
 Lat: 14° 49' 23.5" Long 120° 17' 16.6"

CHAIN: Riser: +90% SL + DL
(78 Data) G.R.: +90% DL (?)

VOLTMETER -.641 to -.658
RANGE:

COMMENTS: Legs Buried In Mud, Not Inspected
 Ring 2' Off Bottom
 365 Day Usage
 Last O.H. 63 Next O.H. '83 Too Long
 Called "GOOD" FY 82
 Depth 17' in '63, 26' in 82 ?!

STATION & # - (CLASS)

SUBIC - 11 - (D- RISER)

FILE DATA: 3 JUL 63 Mooring Report
 15 OCT 65 Mooring Report
 7 APR 72 Inspection Report
 10 JUL 78 Inspection Measurements

MOST RECENT DATA:

SITE: Depth = 120'
 Bottom = Mud
 Lat: 14° 46' 46" Long 120° 15' 45"

CHAIN: Riser: +80% SL - 80% DL
(78 Data)

VOLTMETER -.661 to -.704
RANGE:

COMMENTS: Riser Disappears Into Mud
 No Sign of G.R.
 Last O.H. 80 Next O.H. '86
 No Usage
 Called "GOOD" FY 82

STATION & # - (CLASS)

SUBIC - 16 - (D-RISER)

FILE DATA: 28 FEB 73 Inspection Report
6 JUL 78 Inspection Measurements

MOST RECENT DATA:

SITE: Depth = 26'
Bottom = Mud
Lat: 14° 49' 25" 120° 17' 72"

CHAIN: Riser: +90% DL + SL
(78 Data)

VOLTMETER -.641 to -.652
RANGE:

COMMENTS: G. R. Buried In Mud
Last O.H. 65 Planned O.H. '70 Overdue
365 Day Usage
Called "GOOD" FY 82

STATION & # - (CLASS)

SUBIC - 17 - (D-RISER)

FILE DATA: 15 NOV 68 Mooring Report
24 JAN 73 Inspection Report
6 JUL 78 Inspection Measurements

MOST RECENT DATA:

SITE: Depth = 25'
Bottom = Mud
Lat: 14° 49' 24" Long: 120° 17' 11"

CHAIN: Riser: +90% DL + SL
(78 Data)

VOLTMETER -.641 to -.652
RANGE:

COMMENTS: G. R. Buried In Mud
365 Day Usage
Last O.H. '79, Next O.H. '84
Called "GOOD" FY 82

STATION & # - (CLASS)

SUBIC - 19 - (B-TELEPHONE)

FILE DATA: 31 JUL 61 Mooring Report
24 AUG 67 Mooring Report
1 MAR 73 Inspection Report
10 JUL 78 Inspection Report

MOST RECENT DATA:

SITE: Depth = 83'
Bottom = Mud
Lat: 14° 48' 31" Long: 120° 17' 04"

CHAIN: Leg 1: -80% SL + DL
(78 Data) Leg 2: -80% SL + DL
Leg 3: -80% SL + DL

VOLTMETER -.636 to -.711
RANGE:

COMMENTS: Anchors Buried, Not Inspected
Last O.H. in OCT '80, Next O.H. '86
Called "GOOD" FY 82

STATION & # - (CLASS)

SUBIC - 21 - (D-RISER)

FILE DATA: 25 MAY 73 Inspection Report
7 JUL 78 Inspection Measurements

MOST RECENT DATA:

SITE: Depth = 86'
Bottom = Mud
Lat: 14° 48' 14" Long: 120° 16' 29"

CHAIN: Riser: +80% DL + SL
(78 Data) G.R.: +90% DL
Leg 1: +90% SL, + 80% DL
Leg 2: +90% SL, + 80% DL
Leg 3: +90% DL + SL

VOLTMETER -.646 to -.701
RANGE:

COMMENTS: Anchors Buried, Not Inspected - '78
Wirerope Tangled Around G.R.
O.H. in '69 Planned O.H. '81, Overdue
Called "FAIR" FY 82

STATION & # - (CLASS)

SUBIC - 25 - (B-TELEPHONE)

FILE DATA: 31 JUL 61 Mooring Report
24 JAN 73 Inspection Report
12 JUL 78 Inspection Measurements

MOST RECENT DATA:

SITE: Depth = 110'
Bottom = Mud
Lat: 14° 48' 31" Long: 120° 16' 45"

CHAIN: Leg 1: +90% SL + 80% DL
(78 Data) Leg 2: +90% SL + 80% DL
Leg 3: +90% SL + DL

VOLTMETER -.631 to -.665
RANGE:

COMMENTS: Anchors Buried, Not Inspected - '78
Last O.H. in MAY '61, Planned O.H. APR '79, Overdue
Called "FAIR" FY 82

STATION & # - (CLASS)

SUBIC - 26 - (D-RISER)

FILE DATA: 31 JUL 61 Mooring Report
31 MAR 77 Mooring Report

MOST RECENT DATA:

SITE: Depth = 84'
Bottom = Mud
Lat: 14° 46' 31" Long: 120° - 15' - 36.1"

COMMENTS: New 30 MAR 77
Planned O.H. MAR 83
Called "GOOD" FY 82

STATION & # - (CLASS)

SUBIC - 28 - (D-RISER)

FILE DATA: 28 NOV 67 Mooring Report
9 APR 72 Inspection Report
6 JUL 78 Inspection Measurements

MOST RECENT DATA:

SITE: Depth = 26'
Bottom = Mud
Lat: 14° 47' 58.5"N Long: 120° 17' 09.4"E

CHAIN: Riser: +90% SL + 80% DL
(78 Data) G.R.: +90% DL
Leg 1: +80% SL, + 90% DL
Leg 2: -80% SL, - 80% DL
Leg 3: +90% SL, + 90% DL

VOLTMETER -.677 to -.702
RANGE:

COMMENTS: Ring 20' Off Bottom
All Legs Go Straight Down Into Mud
Anchors Buried, Not Inspected
O.H. AUG 80, Next Planned O.H. '86
Called "GOOD" FY 82
81 Depth Reported as 42'

STATION & # - (CLASS)

SUBIC - 30 - (A-RISER)

FILE DATA: 14 APR 72 Inspection Report
7 JUL 78 Inspection Measurements

MOST RECENT DATA:

SITE: Depth = 40' - 45'
Bottom = Mud
Lat: 14° 48' 02" Long: 120° 16' 49"

CHAIN: Riser: +90% SL + DL
(78 Data) G.R.: +90% DL
Leg 1: -80% SL + DL
Leg 2: -80% SL + DL
Leg 3: +80% SL + DL

VOLTMETER -.663 to -.705
READINGS:

COMMENTS: Anchors Buried, Not Inspected - '78
O.H. FEB 81, Next Planned O.H. FEB 87
Called "GOOD" FY 82

STATION & # - (CLASS)

SUBIC - 31 - (D-RISER)

FILE DATA: 15 OCT 65 Mooring Report
28 NOV 70 Mooring Report
13 APR 72 Inspection Report
4 DEC 72 Mooring Report
6 JUL 78 Inspection Measurements

MOST RECENT DATA:

SITE: Depth = 48'
Bottom = Mud
Lat: 14° 48' 26" Long: 120° 17' 35"

CHAIN: Riser: +90% SL + DL
(78 Data) G.R.: +90% DL
Leg 1: +90% SL + DL
Leg 2: +90% SL, + 80% DL
Leg 3: +90% SL, + 80% DL

VOLTMETER -.477 to -.712
READINGS:

COMMENTS: Anchors Buried, Not Inspected - '78
Last O.H. JUN 72, Next JUN 81 Overdue
"FAIR" FY 82
365 Day Usage

STATION & # - (CLASS)

SUBIC - 32 - (D-RISER)

FILE DATA: 15 OCT 65 Mooring Report
13 APR 72 Inspection Report
11 JUL 78 Inspection Measurements

MOST RECENT DATA:

SITE: Depth = 110'
Bottom = Mud
Lat: 14° - 46' - 52" Long: 120° - 16' - 08"

CHAIN: Riser: +80% SL, - 80% DL
(78 Data) G.R.: +90% DL
Leg 1: +90% DL No SL Taken
Leg 2: -80% DL
Leg 3: -80% DL

VOLTMETER -670 to -.717
READINGS:

COMMENTS: Anchors Buried, Not Inspected
Last O.H. NOV 79, Next NOV 85
Called "GOOD" FY 82

STATION & # - (CLASS)

SUBIC - 34 - (D-RISER)

FILE DATA: 24 JAN 73 Inspection Report
6 JUL 78 Inspection Measurements

MOST RECENT DATA:

SITE: Depth = 50'
Bottom = Mud
Lat: 14° 48' 07" Long: 120° 17' 28"

CHAIN: Riser: +90% SL + DL
(78 Data) G.R.: +90% DL
Leg 1: +80% SL + DL
Leg 2: +80% SL + DL
Leg 3: +80% SL + DL

VOLTMETER -.700 to -.716
READINGS:

COMMENTS: Anchors Buried, Not Inspected - 78
Last O.H. MAR 81, Next MAR 87
New in 77
Called "GOOD" FY 82

STATION & # - (CLASS) .

SUBIC - 37 - (D-RISER)

FILE DATA: 24 JAN 73 Inspection Report
6 JUL 78 Inspection Measurements

MOST RECENT DATA:

SITE: Depth = 26'
Bottom = Mud
Lat: 14° 49' 24" Long: 120° 17' 18"

CHAIN: Riser: +90% DL + SL
(78 Data)

VOLTMETER -.640 to -.658
READINGS:

COMMENTS: G.R. Buried - 78
Last O.H. OCT 66, Next OCT 83, Too Long
365 Day Usage

STATION & # - (CLASS)

SUBIC - 38 - (D-RISER)

FILE DATA: 29 MAY 75 Mooring Report
25 MAR 76 Mooring Report

MOST RECENT DATA:

SITE: Depth = 42' - 52'
Bottom = Mud & Salt
Lat: 14° 47' 57" Long: 120° 17' 19"

COMMENTS: 365 Day Usage
Last O.H. MAY 79, Next MAY 85
Called "GOOD" FY 82

ANNEX C

1.0 CONTINGENCY PLANS AND PRIORITIZATION.

The inspection plans in Section 4 of this plan are unrealistic in that they assume all of the chain and hardware are accessible and that there is ample time to perform the desired measurements. In the event that conditions for this inspection are not ideal, this section outlines some alternate procedures and sets priorities while remaining flexible.

1.1 Priorities. The following goals are listed in order of importance.

- A. Physical measurement of components not buried in mud.
- B. Accurate position data for buoys and ground legs.
- C. Attempted lifting of buried components for measurement using lift bags.
- D. Use of gold dredge to uncover bottom chain for measurement.
- E. Mooring material inventory.
- F. Local construction capabilities.

1.2 Contingencies.

1.2.1

Ground Legs Buried In Mud. It is anticipated that a large portion of the Subic Bay moorings are buried in mud below the ground rings. When this is the case, the divers shall gather all measurements on the exposed sections of chain and make a brief bottom search to see if the legs reappear or if their orientation can be determined.

Thorough measurement of exposed portions of these moorings are as important as measurements in completely visible moorings. Time permitting, buried moorings will be inspected with more advanced techniques only after the more accessible measurements have been made on all of the moorings.

1.2.2

Excessive Growth On Chain. In Section 4, the divers are instructed to locate the detachable chain connecting links so that the chain on both sides of these links (and midway between these links) can be measured. In the event that the detachable links cannot be located, the divers may substitute gauge measurements at approximate 45' intervals. For convenience, the number of links comprising 45' for different sizes of chain is shown in Table C-1.

In all cases, the approximate length of chain before it disappears into the mud or terminates must be recorded.

TABLE C-1

<u>CHAIN SIZE (IN)</u>	<u>LINKS/SHOT</u>	<u>LINKS/HALF SHOT</u>
3/4	357	179
1 1/4	213	107
1 1/2	179	90
1 3/4	153	77
2	133	67
2 1/4	119	60
2 1/2	107	54
2 3/4	97	49
3	89	45
3 1/2	77	39
4	67	34

Another impact of excessive chain growth will be a reduction in the number of useful photographs. Accordingly, fewer photographs will be requested.

1.2.3 Limited Time. In the event that time is limited by weather, equipment malfunctions, etc., work will proceed in the order of importance shown in section 1.1 of Appendix C.

ANNEX D

SAMPLE INSPECTION FORMS

1.0 Figures D-1 and D-2 depict two forms divers may use to record measurements and orientations respectively.

1.1 Figure D-3 is for use by the Project Engineer to summarize pertinent data.

[illegible]

FIGURE D-1.

TRUE BEARING OF GROUND LEGS

T.N.



FIGURE D-2.

MOORING # _____	CLASS _____
INSPECTION DATE _____	TYPE _____
BOTTOM TYPE _____	WATER DEPTH _____
<hr/>	
BUOY TYPE _____	LEG C LENGTH _____
DIMENSIONS _____	EXPOSED LENGTH _____
CONDITION _____	TYPE CHAIN _____
TOP HARDWARE _____	LINK WIDTH _____
BOTTOM HARDWARE _____	WIRE DIAM. _____
RISER LENGTH _____	
TYPE CHAIN _____	
LINK WIDTH _____	
WIRE DIAM. _____	
	LEG D LENGTH _____
	EXPOSED LENGTH _____
	TYPE CHAIN _____
	LINK WIDTH _____
	WIRE DIAM. _____
GROUND RING LOC. _____	
OUTER DIAM. _____	
WIRE DIAM. _____	
CONDITION _____	
LEG A LENGTH _____	RISER CONNECTIONS _____
EXPOSED LENGTH _____	
TYPE CHAIN _____	
LINK WIDTH _____	
WIRE DIAM. _____	LEG CONNECTIONS _____
LEG B LENGTH _____	OTHER _____
EXPOSED LENGTH _____	
TYPE CHAIN _____	
LINK WIDTH _____	
WIRE DIAM. _____	

FIGURE D-3. MOORING DATA SUMMARY FOR PREPARATION OF "AS BUILTS"

END

DATE
FILMED

6 - 86

DTA